

Toward the Development of an Instrument to Evaluate Learner-Generated Comics

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Abstract—A considerable amount studies in the area of user-generated content (UGC) have highlighted the advancement of learner-generated content. Essentially, learner-generated comics (LGC) production refers to a technology-enhanced educational approach of empowering learners to creatively innovate digital comics. This paper describes a work in progress development of questionnaires for assessing LGC production model. In line with the learner-generated content quality indicator, LGC evaluation must have emphasis on both process and the produced content itself. Therefore, two major instruments are designed to validate the LGC production model and measure the quality of a LGC product. By adapting relevant comics, creative product, conceptual model constructs, attributes and dimensions from questionnaires by prior scholars, future work will focus on validating the constructed instruments.

Index Terms- comics, comic-based research, learner-generated content, instrument development

1 INTRODUCTION

STUDIES have shown that the rapid popularity of User-generated content (UGC) (eg: [1], [2] and [3]), has provided an opportunity for novice computer users to become designers of their own digital content. Supporting [4]'s recommendation for more works on UGC quality criteria and assessment, this study continue to explore the link between the sequence of development and the specificities of the learner-generated content created by the learners. Hence, research on learner-generated comics (LGC) will likely have a significant impact on nurturing innovation and creativity in formal education.

2 LITERATURE REVIEW

2.1 Learner-Generated Content

[5] defined learner-generated content as an educational approach based on empowering students to produce their own contents. Meanwhile, [6] stated that student learning was developed and assessed through learner-generated content; enabling implementation of diverse theoretical and practical skills and deeper understanding of the subject matter.

Unlike instructor-generated content where the produced resources typically provide instructional or procedural information, learner generated content increase emphasis on the learner and deemphasizes teacher- to learner knowledge transfer [7], thus allowing educators to move beyond transmissive approaches [8].

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2.2 Learner-Generated Comics

LGC production refers to a classroom activity or project where learners themselves craft personalized comics in order to reach a pedagogical aim. Crafting LGC for instructive manners has been a subject of great interest in the scientific community (eg: [9], [10], and [11]). This activity operates as a supplementary method for students to absorb difficult academic topics [10] and polishes their research skills [9].

Aside from illustrating graphic novels with traditional materials ([12] and [10]), recent classroom practice begin to interactively utilize digital authoring systems for LGC ([10], [13], and [14]) involving photo-based and pre-made item-based comic development tools [15]. Consequently, [16] suggested that further investigation on LGC production should be carried out to support educators to meaningfully integrate technology into their practice.

2.3 Conceptual Model

This study proposes an LGC production model which functions as a conceptual model that includes the fundamental components for learners to design digital educational comics. As terminology may differ among the varied backgrounds of academics and professionals, this research chooses the definition of reference model or conceptual model by [17] which is an "abstraction that stresses the core terms or concepts which characterize an application domain". His multi-perspective framework for model evaluation includes analyzing the model in terms of economic, deployment, engineering, and epistemological.

Conceptual models are typically graphic depictions of systems that quickly and easily convey the overall functionality of a system [18]. Moreover, a production process is the system of process tasks, specifications, inputs, and flows, etc. that are employed to produce a product [19]. Therefore, an LGC production model refers to the application of a systematic approach that includes

the methodologies, process, and techniques to produce LGC products.

3 OBJECTIVE

Continuing the authors' ongoing research on LGC production model development, instruments consists of questionnaires for assessing LGC production model and the produced educational comics are designed. Software products represent the information-intensive artifacts that are incrementally constructed and iteratively revised through a software development effort [20]. In this study, the product of LGC production model is the learner's educational comic developed using the comic software.

In line with the learner-generated content quality indicator [21], LGC production model evaluation must have an emphasis on both process and the core elements of the produced content itself. While, the LGC product instrument focuses on measuring the quality of the produced educational comics based on its characteristics; which does what it is supposed to do such as capture interest, hold attention, increase understanding, and more.

4 METHODOLOGY

This study will design two major instruments. The role of the first instrument is to evaluate the LGC production model in the perspective of deployment; while the second instrument will measure the quality of an LGC product. The designed instruments will be validated through expert reviews while the reliability of the instruments will be tested through a pilot study. The unit of analysis will include the measurement dimension of the core components of LGC.

5 RESULT AND DISCUSSION

Based on the comic evaluation attributes proposed by past researchers this study will adapt suitable dimensions in validating LGC production model, as discussed in the next subsection

5.1 LGC Production Model Instrument

There are two main evaluation categories to evaluate the proposed LGC production model which are the process and the conceptual components themselves. The results obtained from expert review will be able to answer several key questions based on the following criteria of conceptual model evaluation [22]:

- Are the facts described by the model accepted as correct by the domain experts?
- Are the described instances on the desired level of detail?
- Is the model conforming to necessary standards?

Hence, the items from based on conceptual design model experts review instruments constructed by [23] and [24] as well as maturity model experts review instrument by [25] are adopted. Items from these instruments are

selected because their questionnaire items are specifically designed for model evaluation by domain experts.

Next, the evaluation must concentrate on LGC production method or process. In the perspective deployment, evaluation should focus on criteria that are relevant for the users in the aspects of understandability, usability and attitude [17]. Reflecting these aspects, the characteristics of LGC production model will be assessed by users; which are the learners. According to [26], characteristics of reference models are defined in prior research in Table 1. The characteristics represent a comprehensive set of criteria that incorporates the previous research in reference model field.

TABLE 1. CHARACTERISTICS OF CONCEPTUAL MODEL [26]

Conceptual Model Characteristics	Meaning and Definition
Generality	Degree to which the model performs a broad range of functions and is usable in different cases ease.
Flexibility	Ease with which a model adapts and accommodates to changes of the requirements other than for those for which it was specifically designed.
Completeness	Degree to which all the components of the model are present under a predefined scope.
Usability	Ease with which a user or user firm can operate, implement, and apply the model.
Understandability	Degree to which the purpose, concepts, and structure of the model is clear to the users.

Thus, the user of the LGC production model will assess the model's characteristics in terms of generality, flexibility, completeness, usability, and understandability dimensions. The evaluation items by [27] is adapted into appropriate dimensions because the proposed attributes combined several techniques from various works to assess methodologies and processes. Since [27] claimed that his measurement instrument could be employed as a tool in evaluating system development methodology, than his work is relevant to be adopted in assessing LGC production process. In addition, the items from [28]'s mGBL engineering model evaluation instrument are also heavily borrowed to assess methodology and process. This is due to [28]'s instrument are grounded on a number of evaluation dimensions proposed by prior researchers to evaluate models and approaches which were extracted from different fields such as information technology, education, and project management.

Aside from that, this study also considered [29]'s construct measurement instrument in evaluating LGC production process. The reason is, it provides a practical evaluation framework that combines conceptual model variables related to perceptions of pragmatic quality, semantic quality, and usability, as well as satisfaction outcomes. Therefore, since the constructs are used to assess conceptual model, then they are significant to be adapted in LGC production model evaluation instrument. In summary, the instrument for assessing LGC production model is designed in Table 2.

TABLE 2. PROPOSED LGC PRODUCTION MODEL EVALUATION INSTRUMENT

Dimension	Proposed Items
Generality	<ul style="list-style-type: none"> LGC enables me to summarize what I had learnt in the form of digital educational comic. LGC enables me to elaborate and organise my knowledge the form of digital educational comic. During the digital educational comic development, LGC enables me to relate my learning towards essential theories/ ideas/ information/ knowledge. During the digital educational comic development, LGC enables me to apply knowledge to other situation/ scenario / context. During the digital educational comic development, LGC enables me to reflect prior knowledge and connect it to new knowledge.
Flexibility	<ul style="list-style-type: none"> Using LGC fits well with the way I like to work. LGC enables me to produce digital educational comic according to my own taste and preferences. I have the options to follow or deviate from the phases and activities suggested in LGC LGC enables me to make alterations towards certain phases and activities in digital educational comic development process.
Completeness	<ul style="list-style-type: none"> All the concepts and components included in LGC are strictly necessary for digital educational comic development. All the components in LGC are relevant for the representation of the digital educational comic development process. LGC gives a complete representation of the digital educational comic development process. LGC enables me to accomplish tasks in digital educational comic development more thoroughly. LGC allows me to intelligently check the relevance and completeness of my digital educational comic.
Usability	<ul style="list-style-type: none"> Using LGC produces the digital educational comic, for which it is intended for. LGC is useful in providing information I need on digital educational comic development. Using LGC enhances the quality of my digital educational comic. LGC would be an improvement to a textual description of the digital educational comic development process.
Understandability	<ul style="list-style-type: none"> LGC is clear and understandable. Understanding LGC does not require a lot of mental effort. LGC as a whole is workable. The phases and activities in LGC can be followed.

Overall, by analyzing and combining the appropriate constructs, dimensions, attributes and items from the mentioned authors, the designed instrument is able to evaluate the conceptual model by identifying both process and components within LGC production model. Hence, the instruments are developed to reach the following purposes:

- To validate the LGC production model's components and subcomponents.
- To verify whether LGC production model has achieved its objectives.
- To identify the impact of LGC production model towards comic development process carried out by learners.

5.2 LGC Product Instrument

An LGC product is the produced content resulted from an LGC project; which are the educational comics developed by learners. Thus, the designed LGC product "quality" instrument must assess whether the produced comic provides informative, useful, and understandable content its readers. To assess the LGC product based on its appropriateness in an educational environment, several associated measurement instrument from prior researchers will be adapted.

First, the assessment dimension is adapted based on [30]'s coding scheme to categorize student feedback about learning objects. The principal components consist of four distinct constructs which are interactivity, design, engagement, and usability.

Adapting this instrument attribute is, therefore, convenient to assess LGC product; because educational comics are included as visual aids that support the learning of specific concepts by enhancing, amplifying, or guiding the cognitive processes of learners.

Next, the designed instrument of LGC product should give attention on comic core elements. An ordinal scale review form by [31] is considered as it contains standards for the particular educational topic or subject and comic literary. Meanwhile, [32]'s assessment criteria for the school library graphic novel is also suitable to be adapted on LGC instrument design. Apart from that, [33] suggested several criteria in identifying the purpose of the comic when used in an educational setting. Hence, the attributes in evaluating in Kelley's work will be considered into LGC product instrument.

As a further remark, since LGC production requires learners to creatively produce educational stories in comic form, [34]'s original creative product assessment would be suitable to be adapted to measure LGC product quality. Their sub-scale items and reliabilities for creative product semantic scale include novelty, resolution, and elaboration. Finally, [35]'s previously designed an instrument to rate learners' products on nine factors. In summary, the instrument for assessing LGC product is designed in Table 3.

TABLE 3. PROPOSED LGC PRODUCT QUALITY INSTRUMENT

Value	Proposed Aspect
Learning	Intention <ul style="list-style-type: none"> • Learning Goal Alignment/Adequacy • Agility • Reliability/ Accuracy • References • Argumentation/ Constructive Activity • Consistency
	Outcome <ul style="list-style-type: none"> • Thoroughness • Layout • Emphasis of Key Concepts • Recipient • Sustainability • Prospective
Entertainment	Aesthetics <ul style="list-style-type: none"> • Organization • Clear Instructions • Navigation • Agility
	Enjoyment <ul style="list-style-type: none"> • Plot • Characters • Visual Appeal • Feedback

Hence, these factors should be relevant to be adapted in LGC product quality assessment instrument. The instruments are developed to attain the following purposes:

- To measure the educational impact of the LGC product.
- To assess the entertainment value of the LGC product.

4 CONCLUSION

Overall, this paper has described a work in progress development of instrument for evaluating LGC production model and LGC product. As a conclusion, this study has carefully selected and analyzed previous instruments which focus on evaluating conceptual models, comic core elements, learning objects and creative products. Therefore, by adapting relevant constructs, dimensions and attributes from questionnaires and scales by prior scholars, future work will focus on validating the constructed LGC instruments.

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